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## FIELD TRIPS ISSUE II



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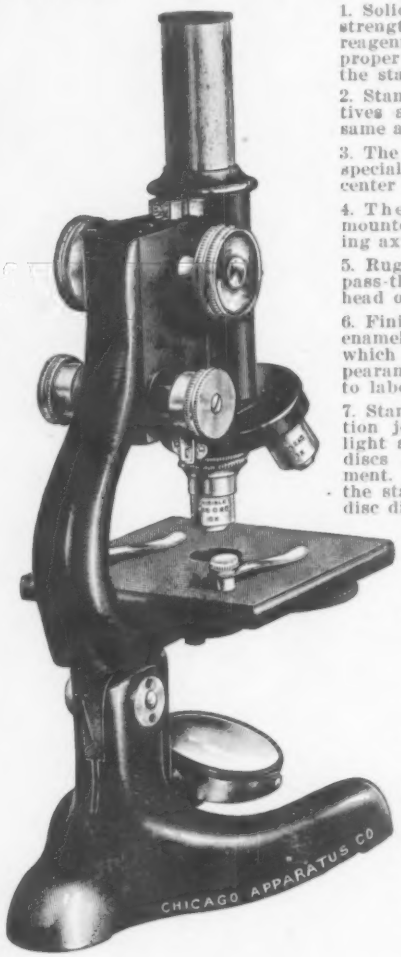


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# The American Biology Teacher

Vol. 8 FEBRUARY, 1946 No. 5


# Teaching Ecological Relationships Through Biological Field Trips

## INTERRELATIONS BETWEEN MAN AND HIS ENVIRONMENT


PAUL B. SEARS
Oberlin College, Oberlin, Ohio


We say of a man whose understanding of human relationships and actions is no longer naïvè, that he has "been around" —a vernacular tribute to the fact that humanity has to be studied outside of the classroom, quite as well as from within that quiet vantage-point. And whenever you leave the classroom or laboratory in order to examine phenomena in their habitual setting, you are doing field-work. This is true whether you find yourself standing on leaf-mould or cinders, under the open sky or in a dark hallway reeking of garlic and fish.

Field-work is a far more venerable method of education than any other. But it has been so completely eclipsed by the schoolroom that good field teachers are rare. They are exponents of an almost lost art, and a very difficult one, at that. Yet the possibilities of modern field teaching, with our present background of knowledge, are enormous. And the need for such teaching in a world which must be brought to understand its physical unity—this need is paramount.

The late Henry Chandler Cowles of the University of Chicago was a superb field teacher. He used to say "If you are going out on a field trip to show something to a class, be sure it's there if you have to sneak out the night before and put it there." I have seen conscientious young scientists shocked by this quotation, as though the great ecologist were recommending some kind of fraud. Actually Dr. Cowles meant no such thing; he was using his delicate gift of whimsy to make clear that field teaching is serious, responsible business, and not just a casual, aimless enterprise. To my

mind, proper field work is more like the weaving of a basket than the filling of one, more like making a tapestry than it is like stringing a necklace.

Very learned and able naturalists (and I am sure this is true of some who study man) often use the basket-filling or necklace-stringing method with classes in the field. Everything that comes along to catch the eye is pointed out and labelled, often with erudite comments, but with no real distinction. In the end the disciples are aware that they have seen many things. They are impressed, possibly fatigued by the muscular scholarship of their guide. But they are left with no sense of the unity and interrelationship of what they have seen. They have the pieces, but not the picture which those pieces form.

For every situation involving man and his environment is in reality a stage of a continuing process, rooted in the past and stemming on into the future. It has meaning and structure, not only in terms of the forces and materials at work, but in terms of their history and organization. Like all processes, at whatever level, it is subject to great general principles. It tends towards a condition of balance, of minimum stress and strain. Thus it has, not only a history, but an economy in terms of which it must be viewed.

It is not enough for the field-leader to understand this in a general or symbolic way. It must have become, through long observation and reflection, a part of the fundamental form of his thought. Here, you see, we run into that old fallacy that a good teacher can teach anything, providing he has a chance to look up the facts a little ahead of his victims. Facts can be looked up and learned, true, but a cast or pattern of thought is the product of one's experience and gradual intellectual development. It is the sort of knowledge which must be intuitive, instead of merely symbolic.

Not all teachers will have the advantage of such maturity and understanding. For their encouragement it may be said that if they will join with their classes in the search for form, meaning, and relationship, both teacher and students will gain and both will grow in understanding. In this sort of enterprise there is no place for arrogance, and none for the teacher who fears to admit the limits of his own knowledge. Good field teaching calls for character, no less than for intelligence and information.

All of these matters are practical, even though they seem general. But what of more immediate practical suggestions?

First, the group should come to understand **the local environment.** In most localities it is possible to get at not only the physical geography, but the biological history of the region as well. Early surveys or other sources have recorded the original vegetation, which is in itself the best integration of climate and soil, an index of animal habit and human economy. The general characteristics of climate and soil and their history, of drainage and communication routes as they apply to a particular township or county are essential, too. Only in such a way can the proper background for man's activities be sketched. All of these things can be made a subject for inquiry, through old surveyors' records and otherwise, in the class. Once gathered, such records ought not be discarded, but rather kept for future classes to build upon and use. And wherever possible, this picture of the physical locale ought to be confirmed by field work. It is amazing, for example, to see how closely, after the lapse of more than a century, the remnants of prairie, oak-hickory, and beech-maple forest in Ohio correspond to the limits indicated on the

first surveys, made before the white man had settled and begun to clear and plow. And with these differences go differences in soil type which still have a powerful economic influence in that state.

Once such a background is set, we can study the phenomenon of **man's relation to it.** Different species of birds have various relations to their environment because of differences in bodily structure, dietary and breeding requirements. A heron is ill-fitted to be a nocturnal bird of prey; an owl as poorly equipped in his turn to be a semi-aquatic bird. But man, with essentially the same general physical needs and equipment, finds the most varied diets, shelter, means of livelihood, and occupies the most varied types of earthly environment. Man varies significantly, not in bodily form, but rather in form of behavior. The technical expression is this, that man adjusts himself to environment by appropriate changes in his culture.

It follows that the field-leader must know the meaning of **culture in this broad sense,** which includes the whole range of human activities. He must have a keen eye for patterns in culture. For example, he must be able to see in the Amish something more than curious people who wear beards and somber clothing. He must sense that they represent an entire scale of values which sets their relation to each other, to outsiders, and particularly to the land. He must be able to get behind the lazy labels whereby we tag those of different cultural background than our own as "savages," "heathen," "hunkies," and the like.

For his own immediate region he and his pupils ought to know the successive tides of immigration and the cultural influences which they represented. What ways of life were represented by Puritan, Cavalier, Swiss, Dutch, German, Scotch? What traces of these ways are still to be seen, in town-plans, architecture, religious groupings, rural life? My colleague at Oberlin, Clarence Ward, has through the years trained hundreds of his students to go through any American town, dating the houses, churches, and public buildings within a decade of the time of their erection, and recognizing the cultural influences that were at work in each particular design. This is the sort of thing one can go into as deeply as he wishes, and always with profit. Lewis Mumford's *The Culture of Cities* is an excellent eye-opener for those who need it.

Outside the cities, the contrast between British settlers, whose interest was primarily fiscal, and continental settlers, whose first concern was generally for the land, is to be seen in many parts of the United States. On a broader scale, it is represented by the difference between New England and eastern Pennsylvania, or that between Virginia and Wisconsin.

The consequences of different kinds of rural culture are to be traced by comparing the maps of original conditions with the airplane photographs of present conditions, available through the Agricultural Adjustment Administration in each county. Most helpful too, as a field aide, are the land use maps prepared in each county by the county Land Use Committee, a group of farmers aided by farmers in determining the quality and proper use of land as it is today. I should like to recommend Edward Graham's book, *Natural Principles of Land Use* as a substantial and sensible introduction to this problem.

Finally, **city and county are not separate.** The industrial history of urban areas generally reflects the changing relation of rural man to the land. Sawmills may give way to flour-mills, those in turn to cheese-factories, as the character of soil products and urban needs changes. A study of factory sites and

buildings can be very revealing. Old tax records and newspaper files, read with a purpose, can be most exciting.

Every acre of land, every farm or watershed has an energy budget. This budget expresses the efficiency with which sunshine is converting raw materials—water, air, minerals—into organic stuff and thus sustaining life. Under natural conditions, the efficiency tends to be high. Only under the most favorable human operation does it remain so. Quite generally it diminishes, lessening the capacity of the area to support life, including human life. The ability to see any landscape in terms of its energy budget is certainly a primary aim in field work.

For a long time, the chief concern of American education was to draw our attention away from the things immediately about us. Our sights were levelled away from home, not so much towards greener fields, as toward paved streets and brighter lights. One consequence has been a costly deterioration of the earth which feeds us, another a loss of quality in the life of small communities.

Today we are beginning to realize that opportunity exists wherever we are. We are challenged to restore the fruitfulness of the earth and the quality of our community life. This means we must see ourselves as a part of the landscape about us, dependent upon it and responsible for its continuing health and productiveness. To this end books or laboratories, no matter how good, are not enough. We must get around and see for ourselves what is going on.

# Field Trip Values and Types

H. E. JAQUES
Iowa Wesleyan College, Mt. Pleasant, Iowa

It is difficult to teach skating or dancing by correspondence. Nature study, likewise, needs to be taken to its source if the best results are to be had. We have been asked to tell our fellow teachers about "our most valuable experiences with field trips." Some suggestions are being given with the hope that they will be helpful. While a rather large percentage of our department students hope to use their biology in a professional way, it is recognized that there are many whose chief interests lie in other fields. For them our courses can contribute only in cultural and avocational ways. We are featuring an outdoor biology, for it seems that in that way the vital needs of these two groups are about equally served. Very often some one of our professional biologists writes to tell how valuable he has found the outdoor trips and to suggest even more field and classification work for the students.

We are fortunate in having a location where natural conditions, with widely varied habitats, are near at hand. When common local materials are to be used in a laboratory exercise, each student collects and brings his own; or if it is something that may be found abundantly on the campus or nearby, the instructor takes his entire laboratory group on a brief field trip out to where Mosses (for instance) are growing. After some noticing of the different forms and nearby habitats, with perhaps some thought about relative sizes, abundance, growth-habits, and associated plants, each student gathers his own specimens for his further work in the laboratory. Fifteen minutes or more and some shoe leather could be saved by using preserved materials or in having an assis-

tant provide the desired plants. But it is felt that this time has been valuably spent in providing mental pictures of natural conditions for the student. Mosses thereafter may mean to him beautiful velvety carpets, or tiny fields and forests in minature instead of some uninteresting thing taken from a smelly bottle kept on a laboratory shelf.

Very frequently the entire laboratory session becomes an extended field trip consuming the full three-hour period or more if necessary. Nearby points of interest are visited on foot. When cars are available more distant collecting places are easily reached. Each laboratory group has its treasurer who arranges for the transportation and collects a fund from the "passengers" to repay the members who furnish the autos. Payment to the car owners is made on a fixed rate per pupil per mile.

Teachers of but limited experience with field trips will likely find it worthwhile to go over the proposed route and note its possibilities before taking his students on the trip. The more experienced naturalist finds a challenge in identifying whatever turns up. It is an exceedingly barren region that does not furnish abundant material to keep active minds employed.

Identification of species and recognition of families is so basic for all other phases of biological study that no apology need be considered for giving primary attention on trips to classification. This should be followed up, however, by pointing out the characters that readily identify the species and family. Then some of the thousands of little interesting habits or characters every outdoor-lover has observed, may be explained, to add zest to the day.

Field trips, to attain their full possibilities, must be interesting, of course, and the presentation attuned to the knowledge and ability of the students. The successful leader will see to it that the objects to be found and studied get

high priority in the students' attention. If the trip degenerates into a social outing or a hilarious hike the teacher in charge would better revise his methods, or mark himself a failure for field trips. There seems to be all too many young folks who have somewhere gotten the idea that a field trip is a vacation from school and when it starts, disciplinary restraint and mental efforts are discarded. Interest, attention and behavior should be at the same high level on field trips as for successful indoor laboratory work.

The field trip should be purposefully planned but not too closely restricted in its observations. Just to study whatever turns up in the whole biological field tends to confusion. To go out looking for birds' nests and refuse to see anything else may deprive the students from hearing about a somewhat rare thing that may be found on the trip.

Each of our students takes his copy of an identification manual with him. If it is a Tree class they may be called upon to run a few trees through the keys for identification. Other specimens are named outright by individual students or the teacher and located in the book.

Actual field characters are carefully compared with those given in the keys and the description. All this helps fix the plant in the student's mind. Notes are taken in the field by the students. Almost every full length field trip ends with a quiz. Paper is furnished by the instructor and a number of questions which may be answered by one or two words are asked. The species pointed out on that or previous trips, and matters discussed, make a basis for the questions. If time permits, the questions are graded in the field and the answers explained. This, then, provides the grade for that day's laboratory work. The knowledge that a quiz is coming up very definitely heightens attention and interest on the part of the students and makes them more observing.

If possible, groups working in the field should be kept comparably small, say twenty or less. Large groups may be divided into sections and given to different instructors for much of the day's work, each group going its own direction for at least a part of the period.

Our most comprehensive field trips have been those run during the summer for the Iowa Insect Survey. The students going on such trips register with the college for Field Entomology or Field Biology—usually the latter. The trip lasts five or six weeks and gives college credit at the rate of one semester's credit per week. The 1941 trip will be used as an example. Two automobiles were taken for transportation. A fairly large trailer house was converted into a field laboratory, offering definite places for keeping the library and equipment carried on the trip. It also housed the instructor's office. The students slept in cabins or shelter houses within the parks, a special camping and collecting permit having been secured from the State Board of Conservation. Seventeen state parks and the Iowa Lakeside Laboratory on Lake Okoboji thus became camping spots for a few days each.

Insect collecting, mounting and identification constituted the major work, but trees and other plants and birds came in for frequent consideration. Besides working each park rather thoroughly, we drove out to neighboring areas of promise, so that more than 40 Iowa counties were visited and given some serious study during this trip. Our course starting at Mt. Pleasant encircled the inside of the state clockwise.

When traveling, or camping near eating places, meals were taken at restaurants, each person ordering as he wished and paying his own bill. When camping in the parks, often rather remote from town, the group prepared the meals. A camp stove and utensils carried in the trailer laboratory supplemented the facilities of the parks. Meals were often

prepared at the park fireplaces and eaten out of doors on the benches. Almost every day, then, saw us having one or more "picnics in a state park." The cost of these meals as well as the operating expenses of the trip were prorated equally among all, including the leader. All the necessary supporting activities of the trip were divided among the members on a somewhat voluntary basis and as nearly equal as possible.

Most of the parks (Iowa has some 65 state parks in all) had electric service. We carried considerable lighting equipment so that the work of the day continued well into the night. A shelter house or park cabin usually provided adequate laboratory room. When necessary the trailer laboratory, which was electrically lighted, furnished additional working space.

One or two light traps were run every night to enlarge the insect catch. This provided many species, especially of moths that would not have been gotten otherwise.

The students going on these trips are biology majors and are rather carefully selected for their ability and interest in the subject. Any one greatly in love with union hours would find the life entirely too rigorous for him. These "Round the Rim of Iowa" trips have been going on for a good number of summers. Each of Iowa's 99 counties has been visited and some collecting done repeatedly, as a part of the geographic and seasonal distribution survey of the insects of Iowa. The trips have furnished the major part of the more than 6000 species of Iowa insects now in the Survey collection.[1] Hundreds of thousands of specimens have been caught and mounted, many of which are not yet determined.

[1] "Some Methods of Labelling and Housing Large Insect Collections," Jaques, H. E., *Canadian Entomologist*, January, 1936.

In these camping trips, contests and quizzes are utilized to enhance the interest and to get larger results.

The handling of field trips needs to be adjusted to the personality of the instructor in charge. The determined teacher will find the right combination for his field trips. We strongly recommend all the serious field work a course will permit.

A quarter-inch mesh minnow seine is very useful for collecting water animals.

## CLASSROOM FILMS

A new plan to make Encyclopaedia Britannica classroom films available to schools on a RENT-TO-OWN basis will be initiated in a limited area in March, 1946.

While the new distribution method will be launched first in the states of Indiana, Illinois, Michigan, Missouri, Wisconsin, Iowa, and Minnesota, it is anticipated that the plan may be extended to other sections of the country.

In making this announcement, H. R. Lissack, Vice-President of Encyclopaedia Britannica Films Inc., said that the new program will have all the advantages of film rental and many of the advantages of film ownership. Approximately 9,500 prints (copies) of classroom films have been placed in the new Encyclopaedia Britannica film library in Chicago to serve schools in the first seven states exclusively.

This is one of the new services initiated after Encyclopaedia Britannica Films Inc., absorbed Erpi Classroom Films Inc. The new plan makes it possible for each school to use each classroom film for a full school week as many times and in as many school buildings as it wishes during that period.

# Practical Suggestions for Field Activity

ROBERT C. McCAFFERTY
Wadsworth High School, Wadsworth, Ohio

The development of cultural elements —biologic perspective, wholesome associations among students, and an avocation—may be well developed through field activity in the biology course.

Observation of trees in the distance, as suggested here in picture and legend, offer inspiration for the future motorist of rural America, whether traveling for business or pleasure. The teacher will enjoy adding to his knowledge of trees in the distance in his own area. Locally, it is noted that the Ash tree has opposite branching, the Lombardy Poplar sharply rising branches, Oaks retain many of their leaves during the winter, Buckeye is one of the first trees to develop leaves in the spring and to lose them in the autumn, Willows, Cottonwoods and Sycamores commonly grow in close proximity to water, and that the bark of White Oak consists of light-colored rectangular layers, the bark of Bur Oak has deep dark fissures and up a ways on the trunk of Red Oak, the ridges of bark become flattened. Most of these characters are readily distinguished during all seasons of the year.

A species that is outstanding at a particular time in your community may be noted by the pupil on his way home from school. Again locally, Norway Maple is outstanding by producing spring flowers in advance of the foliage of other trees. The pupil may be encouraged to observe it further: that the tree has fancy bark, and later in the season when again identified by its bark, that the petioles contain milky sap and the foliage produces dense shade.

An element of the unusual may be best remembered by Johnny. One may cut longitudinally a branch of Walnut and note the diaphragmed hollow pith or a branch of Papaw and note the diaphragmed solid pith. The pleasant odor of a bud of Hickory, the biting taste of a leaf of Sourwood, the ease with which one may break a comparatively large branch of Catalpa, or "pull" off a twig of Willow, notably Crack Willow, are examples. A comparison may be made between the cross-section of a branch of

*American Elm*, in Franklin County, Ohio; this form may be recognized by the division of the main trunk into many branches and by its "umbrella" shape. Photo by Malcolm Forgrave.

fast-growing tree such as Ailanthus with a branch of similar size of slow-growing Oak, the hardness of the wood noted in cutting, the age determined by counting the annual rings, and then some iodine solution applied to the ends to see where starch is located.

An exceedingly interesting and worthwhile week of activity consisted of a teacher learning with the pupils the names of a variety of trees in the school yard. Each had a different kind of book, whatever was available, and sincerely contributed his knowledge until the names of the tree was established.

Another week consisted of keeping ninth-grade science groups busy while studying trees in a city park. The first day consisted of class-room activity. Two boys gathered as many different samples of trees as they could find during the first five minutes of the class period. With the specimens, black-board illustrations, note books and class discussion, the group copied Table 1 and learned the terms, given.

During the next two days in the park, each student checked his table in accordance with the trees that he studied, the names of the trees being supplied freely by the teacher. On the fourth day, notebooks were corrected in the laboratory with the aid of specimens that had been gathered. The last day consisted of a walk in the park to review the names of trees, already learned, and to note some of them in the distance.

A small group of tenth-grade biology students used a class period walking informally along a stream, following a

TABLE 1.--Trees in Memorial Park

| Names of Trees | Opposite Leaves | Alternate Leaves | Simple Leaves | Pinnately Compound Leaves | Palmately Compound Leaves | Pinnately Veined Leaves | Palmately Veined Leaves | Entire Leaves | Saw-Toothed Leaves | Lobed Leaves |
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spring rain. Frogs and toads were picked up out of the wet grass and a woodchuck was seen in the distance. The following period consisted of a discussion of the material observed, together with information the teacher had gained while attending a lecture on wild-animal life a few evenings earlier. This incidental study helped to make an outstanding year for both teacher and pupils.

In one repeatedly successful trip, three boys with limited interest in biology are encouraged to volunteer to collect material from a creek while the rest of the class is in session. This development results from the basic question, "What shall we use and where shall we get material for the aquarium?"[1] Such groups seldom fail to bring back an abundance of material and continue to work with it after the rest of the class has gone.

Whether the first month of the school term or two weeks in spring is used for field work, it may well start with short trips near the school building, followed by laboratory study of the same material. In the autumn, projects may be suggested that will be of use later in the year in teaching.

It is important that each field trip be so planned that every pupil will have definite responsibilities. It should be made clear that the biology class on an outing represents to the public the entire school, and that in this respect, each individual youth has an opportunity and a responsibility. This is laying the foundation for the successful accomplishment of longer trips later on, that may become traditional high lights in the school program.

Each individual or group of individuals in the class may prepare a project dealing with field study, such as:

1. Collecting, pressing and mounting different species of trees.
2. A list of birds observed, including date and habitat of each observation.
3. Preparing a microcosm, terrarium or an aquarium.
4. A list of trees and their locations in a particular area, as a park or street, to be kept and supplemented by future classes.
5. Preserving small specimens of wild flowers in a scrapbook.
6. Collecting and, with the aid of the teacher, identifying algae.
7. Making permanent slides for the microscope, if nothing more than a little algae and water with a drop of glycerine solution, added periodically to the side of the cover slip.[2] (The solution may be made with 15% glycerine, 5% alcohol and 80% water.)

Perhaps some two-period trips can be

*Bur Oak*, in Madison County, Ohio; the massive trunk and branches identify the genus. Its prominent main stem is in contrast to that of the Elm. The large size of the tree and its low-growing branches suggest that it grew in a prairie opening when its location in central Ohio was still inhabited by Indians. Photo by Malcolm Forgrave.

[1] Miller, David F., and Blaydes, Glenn W., *Methods and Materials for Teaching Biological Sciences*, McGraw-Hill Book Co., New York, 1938.

[2] For more permanent slides, see *ibid.*, pp. 282–301.

*Sugar Maple*, in Hocking County, Ohio; note the symmetrically rounded head developed when this tree is grown in the open. Photo by Malcolm Forgrave.

arranged to a creek, oak-hickory forest type or whatever kinds of plant growth are available, where a list of characteristic plants may be obtained.

A wholesome trip is by automobile or school bus in which there are only brief stops at points of interest, as a glacial valley, a roadside park, a tree in the distance, bird life near a pond that may be observed from the road, and comparing from a distance the rounded-shaped trees of an oak-hickory woods with the intertwining branches of a swamp forest where Elm, Ash and Silver Maple predominate.

The climax of the season is the all-day field trip—locally, to a state forest. The short trips are planned to protect school clothes, but on the long trip every one dresses for a tramp in rough country. It will be chiefly inspirational, few details being remembered. A group of girls may be interested in the names of ferns, some boys in unusual trees, and still others in examining the alidade in a forest tower, joint and bedding planes of rock or talus slopes, formed by weathering and erosion, due partly to the growing roots of plants. With so many searching eyes, turtles, toads and snakes will be found.

A few precautions are helpful: One should never wander from the group without a partner; he should yell when lost and listen for the group to answer; he should have a keen eye for poisonous snakes, especially when using hands in climbing steep slopes or picking up anything out of herbaceous growth.

In general, the public is favorably impressed with field trips, especially the short ones on the streets that may be visited casually by passers-by. Frequently, the teacher gets permission from a landlord to examine vegetation on his lawn or farm. Such meetings make for more desirable public relations between the school and community.

Youth in our classes today will make up a portion of the many millions of Americans who will visit, and perhaps as a result of field trips in biology, enjoy more fully one of America's great heritages, our National Parks and Forests.

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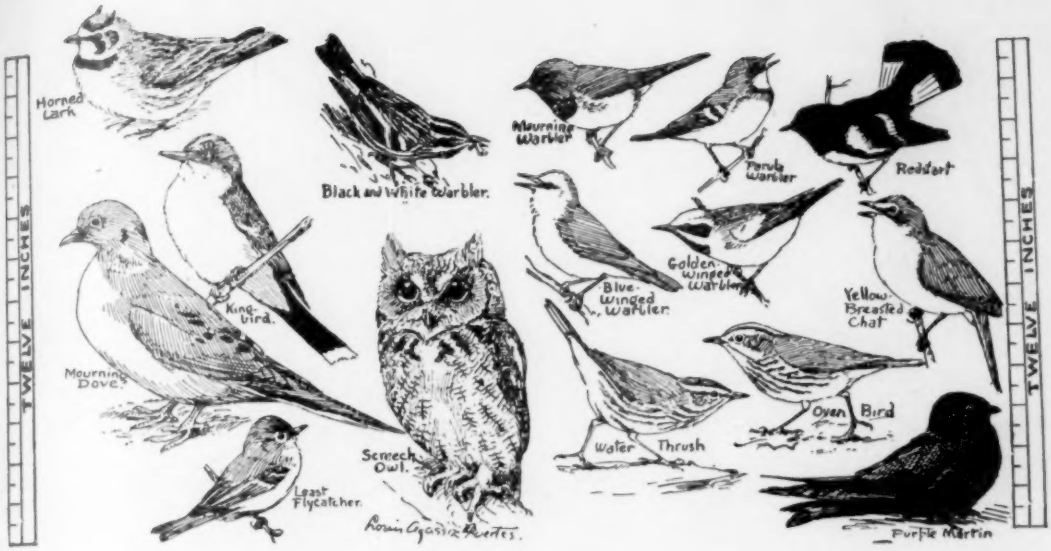


# MARCH 1946

| | | | |
|---|---|---|---|
| 1. John G. Branner, Geologist, died 1922 | | 17. Peter W. Claassen, Entomologist, b. 1886 | |
| 2. Laurence Bruner, Entomologist, b. 1856 | | 18. James G. Needham, Limnologist, b. 1868 | |
| 3. Elmer V. McCollum, Biochemist, b. 1879 | | 19. Henry Morton Wheeler, Entomologist, born 1865 | |
| 4. Henry Baldwin Ward, Limnologist, born 1865 | | 20. John Goodsir, Scotch Anatomist, born 1814 | |
| 5. Sir Charles Thomson, Naturalist, born 1830 | | 21. This month's "blind spot," see below | |
| 6. Wm. T. Hornaday, Conservationist, died 1937 | | 22. Charles S. Sargent, Dendrologist, d. 1927 | |
| 7. André Michaux, Botanist, born 1746 | | 23. Frederick Coville, Botanist, born 1867 | |
| 8. Sir Michael Foster, Physiologist, b. 1836 | | 24. Dana Coolidge, Mammal collector, born 1873 | |
| 9. Thomas C. Stephens, Biologist, born 1876 | | 25. Simon Flexner, Pathologist, b. 1863 | |
| 10. Marcello Malpighi, Physiologist, b. 1628 | | 26. Karl Wilhelm von Naegeli, Botanist, born 1817 | |
| 11. Robert W. Hegner, Zoologist, died 1942 | | 27. Giovanni Grassi, Zoologist, born 1854 | |
| 12. Donald Stewart Welch, Plant pathologist, born 1894 | | 28. Robert B. Wylie, Botanist, born 1870 | |
| 13. Anson R. Walker, Plant pathologist, born 1893 | | 29. Aleš Hrdlička, Anthropologist, born 1869 | |
| 14. Paul Ehrlich, Physician, born 1854 | | 30. Samuel E. Whitnall, Anatomist, born 1876 | |
| 15. Liberty Hyde Bailey, Botanist, born 1858 | | 31. Charles D. Walcott, Paleontologist, born 1850 | |
| 16. D. H. Winkenwerder, Forester, born 1878 | | Next month: Spring Flowers | |

For the best suggestion for March 21 sent to E. Laurence Palmer, Cornell University, Ithaca, New York, a set of 10 bird identification charts will be sent free. Other charts will be sent to those making the first suggestion accepted for any other date for the rest of the year. Let's make our own calendar. How many of the above can you identify?

# Editorial Comment

## FIELD TRIPS ISSUE II

Biological field trips, on both college and secondary levels, have long been recognized and, in addition, urged as a vitally important method for teaching many ramifications of the physical and biological factors of man and his environment. Here, also, is a way of giving students a keener interest in their biology classes. A large number of teachers regularly employ field trips as a means of enriching a student's general education along biological lines. This fact is indicated in an article, based on a questionnaire, published by the *Committee on the Teaching of Biology* of THE UNION OF AMERICAN BIOLOGICAL SOCIETIES.* It is not surprising, therefore, that many requests have been received for special issues of the Journal dealing with this particular subject. In an effort to fulfill these requests THE AMERICAN BIOLOGY TEACHER featured field trip activities in the October, 1941, issue. During the intervening years many requests have been received for a second *Field Trips Issue*. Believing that this important work should be still further developed and its use extended, the task, if it be such, of finding talent for this second issue was undertaken and accomplished.

Field Trips II issue of the Journal is presented to our readers with the belief that it will provide ample diet for both the old and the young in-service field trip enthusiasts.

The writer, whose pleasure it was to handle this assignment, takes this opportunity of thanking the contributing authors for their splendid cooperation in this study. It will, I am sure, be of interest to the authors to hear from teachers who have tried the suggestions offered. A pat on the back is always well received.

LEE R. YOTHERS,
*Guest Editor*

* Riddle, Oscar, "Preliminary Impressions and Facts from a Questionnaire on Secondary School Biology." *The American Biology Teacher*. February, 1941.

## TEACHERS' LIFE-SAVERS

THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS was created because a need was felt for an organization that could penetrate sufficiently deep to awaken not only the teachers of biology but the Nation to the importance of real quality in the teaching of this subject. The association has realized the seriousness of purpose for which it came into existence and is loyally supporting this aim.

No sacrifice is too great on the part of individual, interested teachers to project this goal to their students to help educate the Nation in the field of everyday liveable and practical biology. But how to do this most efficiently is a challenge to the best teacher. She is continually in search of acceptable methods of presentation and study which will be an impetus to her and will give added value to the student.

The war years increased all teacher loads and, even though the United States is no longer at war, the responsibilities of these teachers are still as great as ever. Therefore, teachers look to group meetings and journals to give them invaluable help. The School Science and Mathematics Meeting which met in Chicago in November presented a most excellent and up-to-the-minute program which made those in attendance appreciate the work of the scientist in the educational, industrial, and domestic

fields. One foresaw with delight, fascination, and eagerness the panorama of unbelievable everyday scientific environmental changes which are bound to alter our future routine and ways of living. Such talks made one feel the carefreeness of the future to the extent, that for the moment, one truly relaxed and was rocked in the ease of that tomorrow. But that did not continue for long, because the Atomic Lectures made one conscious of the fact that what could be used most advantageously for man's good might be reversed and be the cause of man destroying himself.

The annual meeting of THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS is to be held in St. Louis in March 29–30, in conjunction with THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, which meets March 27–30. Each biology teacher should exert every possible effort to attend this series of meetings to receive a science tonic that will challenge, inspire, guide, and help her in her work. Pertinent findings and opinions will be presented by outstanding scientists, for the purpose of informing those in attendance in regard to science research that is recent, is being used or will be in the immediate future, and will play its part in changing and molding the future of countries. These talks will be broader in scope and more far reaching than they have ever been.

Busy science teachers, here is a marvelous chance for you to keep abreast of new developments. Don't fail to take advantage of this opportunity to glean up-to-the-minute science and to fraternize.

HELEN TROWBRIDGE

COMING SOON . . . **Riess**—*Snail Studies in Elementary Biology;* **Hall**—*A Live-Trap for Capturing Rodents;* VISUAL AIDS *Special Issue in April;* **Stevenson**—*Adaptation Via the Dandelion;* **Clippinger**—*A Teaching Device for Nature Study.*

## LETTERS TO THE EDITOR

Asheville School for Boys
Asheville, North Carolina

. . . The November issue which came yesterday is, I believe, a typical example of what the journal should be. You included several articles on the organization and content of a biology course and one article (by Book) of an informative nature as background for the teacher. This is about the right proportion for each type.

No biology teacher's background can be broad enough to cover all of the ramifications of the subject. From time to time we should be exposed to a subject we don't know much about, and there should be enough "meat" in the article for us to have to work as hard as we hope our students will work on their assignments. For my part, the paper by Strandskov in the March issue on the Rh factor filled this requirement. I wish you could find room for several such papers every year.

The paper by Greulach in the November issue raised an important question. In what form should book reports be handed in? Can you get somebody to write a paper on the subject to be followed by a series of comments and discussions in a subsequent issue? We all know what we want when we assign outside reading, but I, at least, don't know how to get it.

I enjoy short notes on methods, techniques, gadgets, etc. At present, I have a couple of such notes in preparation and hope to finish them during Christmas vacation. Would it be possible to get enough such notes for a page of them from time to time?

Yours very truly,
JOHN M. HAMILTON

## FUN WITH BIRDS

Start an *Audubon Junior Club* in your class or youth group because it's fun to know about birds—and all the rest of the outdoor world too. Every Audubon Junior Club member receives a membership tag bearing the inscription, "Protector of American Wildlife," and a set of six illustrated, four-page bird leaflets describing the year 'round activities of a bird and the other living things upon which it depends for food and shelter. Each leaflet has a color plate and outline drawing in color. Every club receives NEWS ON THE WING, Junior Club paper (4 issues a year); every teacher or adult leader who forms a club receives AUDUBON TEACHERS' GUIDE, a 96-page booklet with suggestions for club organization, club activities, field trips, and information for clubs about bird

migration, feeding birds, making bird houses, conservation—soil, how wildlife depends on it; water, lifeblood of the earth; forests; grasslands; swamps and marshes—and a general bibliography on natural history.

Ten or more boys and girls of elementary or secondary school age may form a club. The teacher or adult adviser sends combined club dues of 10 cents per child to the National Audubon Society, 1006 Fifth Avenue, New York 28, N. Y. *Please note:* the bird leaflets come in two editions—Junior Edition, large type and simplified text for grades below the sixth; Senior Edition, smaller type and longer text for grades six and above. Be sure to state edition desired.

## STUDENT WEEK-END FIELD TRIP

SPONSORED BY THE DETROIT BIOLOGY CLUB

The Detroit Biology Club undertook a new venture during the week-end of May 18–20, 1945, by conducting a field trip camp-out for selected pupils from several high schools in the metropolitan area. The camp selected was Walden Woods, forty miles distant from downtown Detroit. Each high school chose its own pupils and arranged transportation.

Walden Woods is equipped to handle groups of 150 or more. There is a large dining-hall, as well as three large dormitories. It is a wooded area with a lake, swamp and highland and is a game refuge with a caretaker and his wife in attendance throughout the year.

We arrived with our boys and girls about 6 P.M. Friday. For dinner 99 pupils and teachers were seated at the tables. Instructions, introductions, school songs and yells broke the ice and the group was ready for the "scavenger hunt," which should more properly be called a nature hunt. The pupils were divided into groups of their own choosing and given a list of things to find, such as: a leaf of a monocot plant, any arachnid, the skeleton of a dead vertebrate, an old avian home, the protective part of a mollusk. The evening's entertainment closed with old-fashioned dancing in the dining-hall. This activity was sponsored by the Redford Biology Club.

On the 6 o'clock bird walk Saturday morning, birds were abundant. Forty to fifty different species were seen, including several of the migratory warblers, many Baltimore orioles, vireos, native sparrows and woodpeckers. Tree walks, wild-flower walks, more bird walks, assigned to different leaders, and plain hikes were scheduled after breakfast. In the afternoon there was free time and various unscheduled activities, and movies Saturday evening. That night everyone was ready to sleep and did not rise until breakfast time Sunday morning.

The Highland Park group conducted a chapel service. This was followed by general hikes. After dinner we soon left for home. The camp-out was much enjoyed by the students and the teachers deemed it a worthwhile enterprise. It is hoped that we can make it an annual affair.

M. A. RUSSELL

Hunting fossils; in localities where fossils are readily accessible, they can be a valuable addition to biology, either in high school or college.

## BIOLOGY AT MARIETTA COLLEGE

With the advent of a new president at Marietta College, science has beat a path across the president's estate to the greenhouse adjacent to the chief executive's home. One of the first acts of President William A. Shimer after appointment to his new post was to turn over to the college's biology department the compact and efficient greenhouse unit that had lain idle for more than ten years. Today the 800 square feet of floor space in the house is given over to display purposes and laboratory work. Under the direction of Professors Harla Ray Eggleston and Russell Lee Walp, advanced students are engaged in experimenting in hydrophonics, the science of raising plants with nutritious solutions and without soil, in investigating the nutritious values of various types of soil, and in studying fertilizers and insecticides. Beginning students in biology use the greenhouse to observe correct methods in the raising of plants.

## Annual Convention

of the

## NATIONAL ASSOCIATION OF BIOLOGY TEACHERS

in conjunction with

## The American Association for the Advancement of Science

meeting at Saint Louis, Missouri, March 29–30, 1946
Headquarters at Hotel De Soto

### PROGRAM

FRIDAY, MARCH 29

9:00 a.m. Registration
9:30 a.m. Joint meeting with National Science Teachers Association
12:00 Luncheon
1:30 p.m. Business meetings of Representative Assembly, Executive Board, Editorial Board, Membership and other Committees

SATURDAY, MARCH 30

9:30 a.m. Joint meeting with National Science Teachers Association, for lecture by A. J. CARLSON, University of Chicago
10:00 a.m. Morning Session of National Association of Biology Teachers

*The Integration of the Study of Conservation of Biological Resources with General Education Programs*—FAIRFIELD OSBORN, President, New York Zoological Society

*What Biology Means to Soil Conservation*—EDWARD GRAHAM, Chief, Biology Division, Soil Conservation Service

*A Contribution of the Camping Program to the Conservation Aspects of Biology Teaching*—L. B. SHARP, Director, Life Camps

*Life Camp Movies*

1:30 p.m. Afternoon Session

*How Biology Can Contribute to a Better Wildlife Conservation Program*—IRA GABRIELSON, Director, Fish & Wildlife Service

*The Contribution of the National Audubon Society to the Teaching of Biology and Conservation*—JOHN BAKER, President, National Audubon Society

*Sharpening up Conservation Brass Tacks*—CLAYTON B. SEAGEARS, Superintendent of Conservation Education, New York State

*Conservation of Human Resources Through Health Teaching*—BETTY LOCKWOOD, Redford High School, Detroit

*A National Policy of Conservation Education*—JOHN W. SCOTT, University of Wyoming and the Izaak Walton League

Reports of Activities of other organizations interested in Conservation Education

6:30 p.m. Annual Banquet; joint meeting with the National Science Teachers Association, address by OTIS W. CALDWELL, Boyce Thompson Institute for Plant Research, Yonkers, N. Y.

**Reservations may be made at our headquarters in the Hotel De Soto**
**Guests and friends are cordially invited**

President, PREVO L. WHITAKER
Program Chairman, E. LAURENCE PALMER

# Field Trips Beyond the Campus

C. M. FARMER
State Teachers College, Troy, Alabama

As an aid to teaching nature phases of science, this college for many years has made great use of field trips. Our activity was limited during the war. However, we continued our short trips on the three hundred acres of the college grounds and adjacent territory.

The trips are directed by a staff ranging from one to five instructors. The distance varies from a few hundred yards to several hundred miles, and the time from one hour to two or three days. The college keeps a fleet of buses which are used for such purposes.

Perhaps the best way to present a clear idea of the purposes, plans, and results of our field trips would be to describe one of our integrated course trips in some detail. One of the most important and interesting trips we make is to the Gulf of Mexico.

Troy is at the apex of an isosceles triangle, one side of which extends southeast 150 miles to Panama City, Florida. The base extends 105 miles from Panama City to Pensacola, and the other side extends from Pensacola, Florida, 150 miles northeast to Troy, Alabama.

In the progress of the class, the need for a field trip arises. Therefore, plans and a schedule are prepared. We start early in the morning, with the party consisting of 40 students and a staff of 5 members, which includes a biologist, geologist, geographer, ecologist, and an educationist. As the trip advances, we observe the character of the soil, examples of erosion, plant life, houses—which are indicative of the economic condition of the people—ecological relations, etc. If an instructor wishes, we stop for a detailed study of the point he desires to emphasize.

The first scheduled stop for study is at one of the State's experimental farms, about 60 miles from the college. Following a conducted tour and a lecture by the superintendent of the farm, the party proceeds to Cottonwood and Sealey's Hot Salt Mineral Well, a health resort 14 miles southeast of Dothan, Alabama, where the hot water overflows from a well 4,000 feet deep. The water is so charged with natural gas that it burns when ignited. After inspecting that place, we continue to within a few miles of Marianna, Florida, where we stop at a limestone quarry and collect fossils embedded in the rock. Then we proceed to Marianna for lunch and rest for an hour.

The next point of interest is a small limestone cave about 3 miles from town, but owing to the light wires undergoing repair, we are not permitted to go beyond the mouth of the cave. From this point, however, stalactites and stalagmites may be seen. As students observe them, our geologist explains how caves are formed.

Leaving the cave, we travel to the Torreya forest and state park. Here we study that gymnosperm named for the famous botanist Torrey.

This last place being a detour from our main route, we return to our direct route and proceed to Round and Compass Lakes where we stop and study the cypress trees and other plants growing on the shores. The geologist explains how lakes of this type, without visible outlet, are formed.

Class observing a fossil oyster bed about 13 miles north of Troy, Alabama. C. M. Farmer, instructor.

As we travel from the lakes through the low, flat coastal plain country, we note several kinds of plant life, among which are palmettoes and long leaf pines (*Pinus palustris*) and a satsuma grove. The party stops and the biologist explains that the satsuma (a kind of orange) is produced by budding young plants of the mock orange (*Poncirus trifoliata*) with orange buds.

Finally, we arrive at Panama City on time at 6:30 P.M. Reservations having been made in advance, the hotel quickly conducts members to their rooms. Soon the group is bathed, dressed and ready for dinner, for which all have a perfectly good appetite.

Following dinner, we gather on the moonlight beach and each member of the staff summarizes and emphasizes the high points of the experiences of the day; questions and lively discussions follow. By this time most members of the party are ready to retire, as early next morning they must again be on their way.

The following morning we start west toward Pensacola, Fla., 105 miles distant. I have seen the waters of the Atlantic from Maine to Florida, the Pacific Ocean in several places, and the Great Lakes, but nowhere else do the waters present such beauty as on this drive along the shore of the Gulf of Mexico from Panama City to Pensacola.

Our geographer, who is also a meteorologist, is delighted that no local disturbance prevents the sea breeze at night and the land breeze in the morning. The biologist calls attention to the shore vegetation, some plants of which are very

Section of class studying pond shore life.

restricted in area, as, *Uniola* on the sand dunes, and *Spartina* nearer the water on the shore.

At certain points along the white sandy shore, we stop and pick up sea cucumbers, sand crabs, sand fleas, starfish, barnacles, shells of various kinds, sea urchins, sand dollars, and on the bayous we find hermit crabs, fiddler crabs, crabs, and oysters. These collections are deposited in a drum containing formaldehyde solution to be carried back to the laboratory for further study.

An excellent example of the formation of hooks and bars may be observed where the Choctawhatchee Bay flows into the Gulf. In places, on the drive, we see schools of porpoises in the water, and students are reminded that they are mammals, as is the whale, in spite of the fish-like shape.

We spend the night at Ft. Walton, 64 miles from Panama City, near which is Elgin Field, a U. S. Army flying field. Here, we occupy cottages on the beach which have been engaged for the occasion. In a U. S. Government pavillion, we find an ideal place for our lectures and discussions.

The forenoon of the next day, we move on to Pensacola, studying shore and near-shore life. Pitcher plants (*Sarracenia flava*) grow abundantly along the roadside. Shore and water birds are observed. At one point on a pebbly shore we find tern's eggs, laid in two's among the pebbles which they resemble, for the sun to incubate. This is a characteristic of some species of terns.

In the afternoon we visit the U. S. naval station and old Ft. Barancas and learn something of its history. Turning

our faces homeward, we traverse the third side of the triangle, 150 miles northeastward from Pensacola, Fla., to Troy, Alabama, arriving at about 7:00 P.M.

Upon our return each student is required to write a summary of his findings, which he submits to some member of the staff.

Similar trips are made to the Tennessee River Valley in the northern part of Alabama. On these trips we study the geology, ecology, botany, and industries of that section. At Muscle Shoals we see the great water power development and electric plants producing electric power for the experimental manufacture of fertilizers and rural electrification. The superintendent of the T.V.A. lectures to us explaining the purpose and work of the Tennessee Valley Authority.

On the way back, we visit a U. S. forest reservation and see a variety of trees. Of particular interest is the rapid growth in an old eroded field of long leaf pine, while near there a half dozen white pines (*Pinus strobus*), which have been planted as an experiment, are struggling for existence, more dead than alive.

In and around Birmingham we see iron and coal mines and make a field trip to the mountains nearby to study the geology and biology and make comparison with the coastal plain.

Thus, on these two trips we go from the Gulf to the Tennessee Valley, observing the diversity of soil, plant life, industries, and economic conditions through the length of the state.

The trips which have been described are, of course, in integrated courses where the aim of the staff of specialists is to correlate the various facts learned and bring out their educational implications. Other trips are made by departments for specific study in their particular fields. For example, the history department goes to Montgomery, the state capital, 50 miles away, and visits the state departments of health, education, highway, archives and history. Likewise, classes in sociology visit certain communities, or educational institutions, as, Tuskegee Institute (Col.), or Montgomery State Teachers College (Col.), or other colleges, or penal institutions, insane asylum, etc. Of course, classes in taxonomy make trips to find plants or animals in their habitats. The classes in geography go out to study the landscape. In fact, almost every phase of our work is supplemented by field trips.

On some of the trips, we have made Kodachrome pictures. We now have a good collection of 2× 2-inch slides in colors. In addition to these slides, and as a close second in value to field trips, we find sound movie films. We rent films from the large film libraries and make great use of them every year.

It may be that we have unusually good opportunities here. In addition to the college grounds, consisting of ravines, streams, and woods, there is an unusual geological formation only eight miles distant, known as the Pocosin, with a peculiar plant life in it. Pocosins are not frequently found, and this is not the only one in the world, as strangers are sometimes told by citizens of Troy. Nationally known visiting scientists have said they envied us the splendid opportunities we have.

Every college or high school has the opportunity in its environment for field trips to study things at first hand. All grades of schools may make field trips effective educational aids. To be successful trips must be well planned, the students' interest aroused, and they should be taught what to look for and how to observe the things on the trip. Trips must be well conducted, otherwise they may not be much more than outings with little knowledge acquired.

On a trip, however, if some new inter-

A group of students observing the holding power of *Uniola* ("sea oats") on a dune near the Gulf of Mexico.

est should arise, the original plan may be suspended in favor of the new interest. For example, one of my students planned a trip for his pupils to study a tree. On the way to the tree, a member of the class dug up an egg which became the center of interest of the entire class. When the egg was broken, a little turtle came out. Interest was increased and the turtle was carried back to the schoolhouse, fed and cared for, while the class made observations upon it. Finally, they took it to a nearby stream and turned it loose. The trip could wait, but this new interest could not wait.

Field trips, correctly planned and conducted, are one of the most valuable aids in teaching.

# Planning For A Mammal Field Trip

CHARLES W. QUAINTANCE
Eastern Oregon College, La Grande, Oregon

Birds are the vertebrates generally studied on field trips. Their colorful plumage and distinctive songs make them the ideal animal for outdoor study. Mammals, on the other hand, usually have a dull pelage, may be relatively more quiet and unobtrusive than birds, especially those mammals which are nocturnal in habit. Nevertheless, mammals represent the biological class to which we belong, and they have a decided impact upon our agriculture and forestry. Moreover, boys, and some girls, often already have a keen interest in trapping mammals; this psychological readiness is an asset for such an expedition.

It is therefore fitting that the Agassiz-minded teacher plan a mammal field trip. If properly planned, such a trip can make use of a community problem and can educate students to a thoughtful awareness of some of the factors involved. In fact, if the unit teaching plan is employed, an excellent mammal unit may be achieved.

The enterprising high school biology teacher can build up a successful mammal field trip in any given locality, whether east or west, north or south. The following procedures have been used in various situations and for different kinds of mammals. The author has used a similar technique for a biology class in an Arizona high school to study the Banner-tailed Kangaroo Rat. Some of the directions for students have been adapted from a field trip plan used at the Museum of Vertebrate Zoology at Berkeley, California, in the study of meadow mice.

If the teacher knows mammals only from books, there are many sources of help that can be enlisted. A suggestive list follows: the county agent, a district ranger, a wildlife expert of the Soil Conservation Service or of the National Park Service, a taxidermist in the community, a museum mammalogist, a trapper, a biologist of the State Game Commission, an informed Scoutmaster, an outdoor-

minded member of a nearby college faculty, or even from boys in the class. It may be necessary to try more than one source to find someone enthusiastic enough to act as leader. Together, the teacher and his guide can select the mammal for special study, from shrews or meadow mice to beaver, the appropriate time of year for best obtaining breeding information or hibernation data, and can then make a thorough preliminary survey of the situation. References can be made available for students from free and inexpensive government bulletins, as well as from books on mammals such as listed below. Mammal films may be obtained from government or other sources. A study plan can then be prepared and mimeographed.

Equipment for the trip can be limited to shovels, trowels, string, tape measure, pencils, and graph paper for plotting burrows excavated, nest sites, and the like. Leather gloves may prove useful for spade work and for handling live animals. The teacher appoints captains when the field trip is first outlined to the class, and these captains select teams of from four to eight. Competition to squeeze all possible information out of the morning field trip may run high and more equipment be added. Teams who wish to obtain animal tracks will take plaster of Paris. Enterprising teams may take plant presses. Cages are taken by those who wish to secure live animals for laboratory observation. Live reptiles will often be obtained in this way also. Some students may wish to try taxidermy Since animal weeds must be controlled, the county agent plants poison at a few burrows at the beginning of the morning, and dead ground squirrels are obtained while students are digging. Scalpel and scissors are at hand to open up the specimens for study. Alcohol or formaldehyde in jars or cans may be brought to preserve, for example, a pregnant female, opened to show the embryos in the oviducts. Numbers of embryos are counted. An accurate gram scale is desirable, to weigh specimens of adults and of young.

Transportation requirements for a mammal field trip need be no different than for any other field trip. For us, private cars are not always available in sufficient numbers; a bus is chartered to make additional room. Six teams of eight each seems to be about the right number where the organization has been well worked out beforehand, and there is at least the county agent and the teacher with an assistant who has been on trips in previous years. We usually have had to take two successive Saturdays because of numbers.

The complete plan as given to our students is submitted here as a tentative guide to those who wish to make similar plans.

**Biology 103.** *Field Trip for all Teacher-Training Sections.* Saturday, April 14 and 21. Meet at College flagpole. 8:00 A.M. Purpose of trip: To study the ecology of one of the ground squirrels, *Citellus sp.* (that is, to study it in relation to its environment). How does the squirrel fit into the natural scheme of things: How has man's grazing of stock changed the original picture? Should ground squirrels be controlled? How?

**Leader:** R. W. Schaad, County Agent, Union County, U. S. Dept. Agr.
**Place:** McCall Ranch, Hot Lake Road.

I. Questions for Study Prior to Trip. Refer to Bailey, *Mammals of Oregon;* Hamilton, *American Mammals;* Nelson, *North American Mammals;* Bronson, *Chisel-Tooth Tribe* (section on spermophiles); Anthony, *Field Book of Mammals;* Chafee, *Western Wildlife.* . . . See reserve shelf.

Museum specimens of *Citellus, Microtus,* the Short-eared Owl, the Marsh Hawk, etc., will be on display all week in biology showcase.

What is the difference in structure between ground squirrels and tree squirrels (*e.g.,* pine squirrel or chickaree)? How do tails seem to be correlated to their habitat and the use

the animals make of them? Do ground squirrels ordinarily climb trees and bushes? What kinds of ground squirrels do we have in and around La Grande? (Note: There are two different genera represented, *Citellus* and *Callospermophilus;* we are concerned here with a species of *Citellus.*) There is one *Citellus* found chiefly in mountain meadows, and one species on plains in the valley. How can you tell them apart: by calls? Size?

During what period of year are ground squirrels active in our region? When do they come out in spring? When are young born? How many young? How many litters in one season? How soon do young first leave burrows after birth?

II. Questions for Study and Observation at McCall Ranch.

*General.* In order for you to answer these questions at first hand, you will be given opportunity to browse around prior to the digging. Is this good land for farming? For grazing? What are your reasons for answering so? Would you call this *sub-marginal?* (What would you mean by this?)

Look for evidences of *alkali.* What color is alkali? (May there be different colors?) Is alkali water bad for stock?

What plant and animal associations are found here?

Some years the meadow mouse, *Microtus,* is so abundant it is found easily in daytime. Look for its runways. Can these tiny rodents harm the crops of the Grande Ronde Valley? How could they do damage in orchards?

Are *sagebrush* and *greasewood* the same thing? Are there any insects that live on these plants as parasites? How does the plant react to this?

Do you find any ant hills? Are the ants large or small; are they red or black? Are they active during the heat of the day, or at least while we are there? Do you find any evidence of animal food on their hills? Look for tiny bones and shells. Can you tell what kind by detective work?

*Caution:* Probably none of these animals are sick, yet bubonic plague or tularemia have been found in Oregon ground squirrels. It is advisable not to handle any squirrel which is easy to catch. Leather gloves may prove useful.

*Economic importance.* Do these ground squirrels eat the same food as cattle? Do they compete for the best grasses, or do they eat any grass? (Bend over to examine grass for marks of browsing.) The county agent will help you to learn *wheat grass* and *downy brome grass.* Are these good to eat? Try them. What kind of a taste do you get from the brome? Would you call it palatable (tasty)? Do the squirrels eat the grasses?

*Feeding.* Observe animals feed. Do they feed just near their burrow? Are their runways well-beaten? How wide? Any evidence of feces (fecal pellets)? Where found?

*Homes.* Work with your team in dissecting a burrow system. Men will do the shovel work. Girls will take measurements; map and draw diagrams. Make accurate notes on length and width of burrows; directions; secretary note nests, food storage places. Is there any evidence that squirrels provide against floods or heavy rains? If so, what? Do you think squirrels thoughfully make such plans?

*Families.* There will be considerable competition to see which team first locates a nest of young. This need not necessarily be deep. A nest found last year was less than a foot below ground.

*Natural enemies.* What evidence do you find for animals that control the squirrels, both old and young? Do coyotes range here? Do you see any Marsh Hawks? Male or female? The owls flying in the daytime are Short-eared Owls.

What methods of artificial control are used to control population? How effective are these means?

We try to make these directions explicit enough for preliminary library and museum study and also for the actual field trip, yet questions are raised which the student needs to answer through individual observation and attentive listening during any group discussion in the field.

Students are required, after the field trip, to hand in a complete summary of the work done by their team together with answers for the foregoing questions. Evaluation is also made of the work through brief objective quizzes.

## SAINT LOUIS MEETING

According to information received in time for the final proof of this issue the headquarters for the annual convention in the Hotel De Soto will be *Parlor C.* The program sessions on Saturday will be held on *15th floor,* and the joint session with the National Science Teachers Association on the *16th floor.* The place of the banquet had not been scheduled at the time of going to press.

# Factors Which Determine Successful Field Trips

LT. (J.G.) G. B. LUCAS

Frequently, teachers of biology courses, after presenting the same subject over a period of years, may drift into a monotonous routine which robs "nature" subjects of one of their most pleasurable aspects. In this connection, three negative factors may be mentioned. These are: (1) lack of specific training, (2) lack of preparation, and (3) lack of enthusiasm. All three contribute to making a field trip, when undertaken, a tiresome walk, rather than an opportunity to study plant and animal life in the greatest laboratory of all.

To successfully conduct a trip, biology teachers must know many phases of biological science. Too often a zoologist knows an insufficient amount of botany; and the botanist in turn may not understand the problems of the zoologist. Biology teachers, therefore, need a broad preparation and working knowledge of subjects outside their own special interests. It must be remembered that on any field trip many species of plants and animals worthy of study will be encountered. Naturally, many students will query the teacher as to the name or habits of organisms. Such evidence of interest, on the student's part, should not be passed off with a noncomital shrug by the teacher. If, for example, a botany specialist is unfamiliar with the common name (at least) of frequently seen animals, he detracts from the value of his own subject and misses opportunities to teach basic interrelationship and interdependency of living things. Life, in nature, is not isolated and independent. To enable students to comprehend and enjoy science, the teacher must constantly present the broad picture rather than narrow, limited views. When in the field, no opportunity should be overlooked to study examples of parasitism, commensalism, predatism, symbiosis, evolutionary trends, etc. Such topics, when introduced by the skilled teacher, will keep the attention of the group focused on nature subjects. Also, the time required to walk from one exhibit to the next may be spent profitably discussing the plant-animal relationships observed, rather than such diverse topics as baseball or movies, interesting as they are. It is the teacher's responsibility to guide such discussions properly by inviting comments from the class and interjecting pertinent facts and observations to maintain interest. To do this adequately and intelligently one must have more than a casual knowledge or interest in these fields.

A biology teacher should ever possess a healthy curiosity concerning living things. This interest may be heightened through active affiliation with many science organizations and wide reading of scientific journals. The teacher who follows such a course will have little difficulty keeping abreast with scientific advancement. Field trips under such an instructor are meaningful.

Lack of preparation, on the other hand, detracts from the value of field trips. The teacher must plan the excursions with great care if he is to make the trips worth the effort. Such simple considerations as where to find a specimen and when to find it are often completely

A "night" field trip; high school boys using flashlights in looking for frogs that are active at night. See LACROIX, *Collecting Spring Peepers*, March, 1944, page 138.

overlooked by the uninitiated. Adequate allowance for the weather and locale must be made. Field trips are too often made in improper attire. Interest can seldom be maintained while suffering bodily discomfort. Even the pace of walking from one location to the next should be regulated. The teacher who persists in speeding from one exhibit to the next, will soon find himself talking to a handful of more enduring students, while the rest of the class straggles along a few hundred yards behind. Also, if a two-hour laboratory period is spent walking a mile or more to view one specimen and then walking back, it would be wise to consider whether the lone specimen was worth the time devoted to it.

Adequate transportation on field trips is a primary requisite. If this consideration is left until the last minute the result may be confusion, delay, and misunderstanding. The type of transportation, the place of meeting, and the time of meeting should all be decided well in advance if the trip is to proceed smoothly and without mishap. Proper equipment is a "must" for field trips. A notebook and pencil should certainly be carried to record impressions and notes at the scene while still vivid. If plants are to be collected any of the pulp magazines make suitable temporary presses in which to carry specimens till they can be properly cared for (notes on the specimens can be written down on the page margins). Similarly, killing bottles and collecting nets are needed in case insect specimens are seen. A sheath knife and small first-aid kit are likely to be needed before the trip has ended. These are just a few items which may be mentioned to indicate how necessary it is to make definite plans for each venture and to equip oneself accordingly. As in most other projects, a little forethought and planning save one from many disappointments and, at the same time, enable one to make the most of every opportunity.

Instructors should constantly be on guard against falling into the rut of monotonous presentation. Also, field trips should not be used as an excuse to have one less lecture period; nor should they be undertaken simply because the curriculum calls for a certain number of outdoor excursions each term. Students soon become aware of indifference and apathy on the part of the instructor and, as a result, the course rapidly becomes a boresome chore, to be gotten over with and forgotten as quickly as possible.

At present, educational systems and techniques are under close scrutiny by both laymen and skilled investigators. It is important, therefore, that all teachers utilize the most valuable means and methods to educate our young people adequately and properly. In biology, well-planned and well-executed field trips are a must.

## HOTEL RESERVATIONS

All requests for reservations must be received *before* **March 17.** Our headquarters are in the De Soto. Other nearby hotels are: Jefferson, Lennox, Majestic, Mark Twain, Mayfair, and Statler. At somewhat greater distance are the American, Claridge, Coronodo, Gatesworth, Melbourne, and Roosevelt. Single rates range from $2.00–7.00. Double rates run $2.75–10.00.